Number 13

Proceedings

of

The Canadian Phytopathological Society

Twelfth Session

June 25-28, 1945
SASKATOON
Sask.

IMPERIAL MYCOLOGICAL INSTITUTE
30 APR 1946

Editorial Committee

R. S. WILLISON
THORVALDUR JOHNSON
B. J. SALLANS

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The Canadian Phytopathological Society

LIST OF OFFICERS AND COUNCIL
1944-1945

President

T. C. VANTERPOOL, University of Saskatchewan, Saskatoon, Sask.

Vice-President

L. W. KOCH, Dominion Laboratory of Plant Pathology, Harrow, Ont.

Secretary-Treasurer

THORVALDUR JOHNSON, Dominion Laboratory of Plant Pathology, Winnipeg, Man.

Councillors

F. J. GREANEY, Dominion Laboratory of Plant Pathology, Winnipeg, Man.

J. C. PERRAULT, Dominion Laboratory of Plant Pathology, Ste. Anne de la Pocatiere, Quebec.

Lewis Ralph Jones

Ph.B., Ph.D.
1864-1945

The members learned with deep regret of the death of Professor L. R. Jones on April 1, 1945. Professor Jones had a long and distinguished career as a teacher and investigator in the botanical sciences, particularly phytopathology. Soon after the organization of the Canadian Phytopathological Society, Dr. Jones was elected an honorary member.

Dr. Jones was born on a farm near Brandon, Wisconsin, on December 5, 1864. His advanced studies in botany were made at the University of Michigan. Later he taught in Illinois and Vermont, finally going to the University of Wisconsin in 1909 to organize a Department of Plant Pathology. As head of this department, he helped and advised many Canadian workers who sought advanced training in phytopathology. He will be remembered as a kindly and wise counsellor by his students.

Although Professor Jones did not visit Canada often, he was nevertheless well known to most Canadian workers through their constant contact with him on problems of international importance. He was a loyal friend and supporter of our society. Through the contributions of his many students, his influence on the future of phytopathology will long be felt throughout the world.

INVITATION PAPERS

On the afternoon of Tuesday, June 26, two papers were presented by invitation. The first paper, by Dr. D. L. Bailey of the University of Toronto, dealt with Canadian plant pathology in retrospect and prospect. This paper has already been published in the September 1945 issue of the Agricultural Institute Review. The second paper, by Dr. K. W. Neatby, Director of the Line Elevators Farm Service, dealt with the interrelation of plant pathology and plant breeding in the production of disease-resistant varieties. It is hoped that this paper will be published shortly in the above-mentioned review. Both papers were very well prepared and evoked considerable discussion.

MINUTES OF THE TWELFTH ANNUAL MEETING HELD AT THE UNIVERSITY OF SASKATCHEWAN, SASKATOON, SASK., JUNE 25 TO 28, 1945

BUSINESS SESSIONS

The meeting was called to order by the President, T. C. Vanterpool, at 1.30 p.m., June 25. Fourteen members of the society were in attendance. In his opening remarks the President referred to the passing of Dr. A. H. R. Buller, Dr. H. H. Whetzel and Dr. L. R. Jones. He also extended the congratulations of the society to Dr. J. H. Craigie on his attainment of the position of Dominion Botanist and on his election to the Vice-Presidency of the American Phytopathological Society.

Three convention committees were then appointed from the chair:

Resolutions—A. W. Henry, W. A. F. Hagborg, H. W. Mead.

Publicity—R. C. Russell, J. E. Machacek, L. E. Tyner.

Nominations—D. L. Bailey, G. B. Sanford, T. C. Vanterpool.

It was moved by B. Peturson and seconded by J. E. Machacek that the minutes of the previous (eleventh) meetings, held at Toronto, be accepted as read. Carried.

The report of the Secretary-Treasurer was read and adopted on a motion by T. Johnson, seconded by H. W. Mead.

The report of the War Emergency Committee was read by T. Johnson and adopted on a motion by T. Johnson, seconded by A. W. Henry.

The report of the Committee on Membership was read by T. Johnson and adopted on a motion by T. Johnson, seconded by W. A. F. Hagborg.

The Secretary-Treasurer stated that no reports had been received from the Common Names Committee or the Editorial Committee.

It was moved by P. M. Simmonds and seconded by B. J. Sallans that a memorial tribute to Dr. L. R. Jones be prepared, and inserted in the minutes by the Secretary-Treasurer, and that this tribute be forwarded to Mrs. L. R. Jones and be published in the next Proceedings of the Society. Carried.

It was moved by D. L. Bailey and seconded by A. W. Henry that the memorial tributes to Dr. A. H. R. Buller and Dr. H. H. Whetzel, prepared on authority of the Council, and published in the Twelfth Proceedings, be approved and recognized in the minutes. Carried.

The report of the Committee on the Constitution and By-Laws was presented by D. L. Bailey.

After considerable discussion on the proposed constitutional revisions, it was moved by D. L. Bailey and seconded by J. E. Machacek that the proposed changes in the Constitution of the Canadian Phytopathological Society as suggested by the Committee be approved by this meeting and submitted to the membership for a formal vote. Carried.

Business Session, June 27, 1945—4.00 p.m.

It was moved by D. L. Bailey and seconded by A. W. Henry that, if the constitutional changes which have been approved by this meeting are passed by the vote of the members at large (1) the amended constitution shall be published in the next issue of the Proceedings and that a reserve of fifty extra copies be ordered, with the object of submitting to each new member a copy at the time of his election to the Society; (2) the Secretary-Treasurer be requested to incorporate in the first notice of dues sent out each year the section dealing with dropping of members for non-payment of dues.

It was moved by D. L. Bailey and seconded by A. W. Henry that a Nominating Committee as designated in Article VI of the revised constitution be appointed provisionally to function for the coming year if the constitutional changes are approved.

It was moved by P. M. Simmonds and seconded by W. C. Broadfoot that the Provisional Nominating Committee be composed of, in addition to the ex-officio members, T. C. Vanterpool (as Chairman), F. J. Greaney —H. R. McLarty, I. L. Connors, and J. F. Hockey. Carried.

Moved by T. C. Vanterpool and seconded by D. L. Bailey that B. J. Sallans and P. M. Simmonds be appointed auditors for the year 1945-46. Carried.

It was moved by L. E. Tyner and seconded by J. E. Machacek that the Regional Representatives who served last year be re-appointed for another year and that they be so notified by the Secretary-Treasurer. Carried.

The report of the Resolutions Committee was read and adopted on a motion by A. W. Henry, seconded by H. W. Mead.

In a report on the activities of the Publicity Committee, R. C. Russell stated that this committee had submitted to the press abstracts of the various papers presented at the meeting on the understanding that the newsmen would consult the authors of the papers before any press items they wrote were published. The report was adopted on a motion by R. C. Russell, seconded by L. E. Tyner.

The report of the Nominations Committee was submitted and adopted on a motion by D. L. Bailey, seconded by G. B. Sanford. The committee made the following suggestions: (1) that the Editorial Committee edit the Proceedings. Editorial Committee consisting of R. S. Willison, Chairman, T. Johnson, and B. J. Sallans; (2) that the War Emergency Committee be continued for another year and that it consist of the President as Chairman and the Regional Representatives as the additional members. Carried.

It was announced to the meeting by the President that the Executive recommended to the Society the election to honorary membership of Dr. E. C. Stakman, Head of the Department of Plant Pathology, University of Minnesota, and Dr. S. P. Wiltshire, Director of the Imperial Mycological Institute, Kew, Surrey, England. This recommendation was unanimously approved by the meeting.

It was moved by B. Peturson and seconded by R. C. Russell that an honorarium of $15.00 be paid to Miss A. S. Karp for stenographic services performed during the year 1944-45.

It was moved by G. B. Sanford and seconded by A. W. Henry and carried, that copies of the Proceedings of the Society be furnished without charge to the Library of the Department of Agriculture, Ottawa, Ont., the Library of the United States Department of Agriculture, Washington, D.C., and the Library of the Imperial Mycological Institute, Kew, Surrey, England.

The following names were proposed for membership and approved on a motion by R. C. Russell, seconded by J. E. Machacek: Frances C. Mellor, J. C. Wilcox, J. J. Miller, K. W. Neatby, B. J. Sallans, R. J. Ledingham, H. M. Good.

It was moved by W. C. Broadfoot and seconded by P. M. Simmonds that the Secretary-Treasurer be instructed (1) to forward to Dr. F. L. Drayton the greetings of the society and its wishes for a speedy recovery from his illness; (2) to forward to Dr. Margaret Newton a letter expressing the regrets of the society that ill health should have forced her to abandon her researches that for many years have added distinction to Canadian phytopathology. Carried.

It was moved by A. W. Henry and seconded by T. C. Vanterpool that the invitation papers presented by Dr. D. L. Bailey and Dr. K. W. Neatby be published in full in the C.S.T.A. Review or some other suitable publication by arrangement between the executive of the society and the authors. Carried.

A concluding business session was called to order at 10.30 a.m., June 28.

Following a discussion on the financial affairs of the society, it was moved by G. B. Sanford and seconded by D. L. Bailey, and carried, that (1) a memorandum on the financial position of the society be prepared by the Secretary-Treasurer and forwarded to the regional groups with the purpose of having the groups consider the advisability of increasing the annual dues of the society, and (2) that the regional groups be requested to express an opinion on the desirability of securing sustaining members for the society.

It was moved by D. L. Bailey and seconded by L. E. Tyner, and carried, that the custodianship of the records of the society be detached from the secretaryship and that T. Johnson be appointed custodian for the year 1945-46 and that he be requested to prepare a report for the next meeting as to future policy in regard to the library and other records of the society.

It was moved by W. C. Broadfoot and seconded by A. W. Henry that the society set up a committee on publicity to explore the field of the public relations of the society. Carried.

It was moved by L. E. Tyner and seconded by B. Peturson that D. L. Bailey be appointed Chairman of a Public Relations Committee to function for one year, and that he be given the power to select the personnel of the committee.

It was moved by W. A. F. Hagborg, seconded by W. C. Broadfoot, and carried, that a memorandum be forwarded by the Secretary to the Dominion Botanist informing him that it was the sense of this meeting that, inasmuch as Universities, by virtue of their libraries, facilities, and opportunities for ready consultation, offer the atmosphere which is most conducive to a high type of research effort, due consideration should be given to the possibility of establishing or maintaining affiliation with universities in the expansion of existing regional laboratories or the location of new ones.

RESOLUTIONS

1. Whereas at a regular meeting of our society held on June 26, 1945, in Saskatoon, two of our members, Dr. D. L. Bailey and Dr. K. W. Neatby, each delivered a stimulating invitation paper, be it resolved that we express our keen appreciation to these gentlemen for their generosity in responding so acceptably to our request for these papers.
2. Whereas we the members of the Canadian Phytopathological Society during our visit to Saskatoon on the occasion of the C.S.T.A. Convention, held there from June 25 to 28, 1945, have

enjoyed many privileges, facilities and courtesies extended to us by the University of Saskatchewan, be it resolved that we convey to the President and his staff our sincere thanks for their kindnesses.

3. Whereas we the members of the Canadian Phytopathological Society, during our visit to Saskatoon on the occasion of the C.S.T.A. Convention, held there from June 25 to 28, 1945, have enjoyed the generous hospitality of the Government of Saskatchewan, be it resolved that we acknowledge this with sincere thanks.
4. Whereas the Committees on Arrangements of the C.S.T.A., on the occasion of the Convention held in Saskatoon, June 25 to 28, 1945, have provided so well the services needed for our society on this occasion and have contributed so greatly to the comfort and pleasure of our members, their wives and friends, be it resolved that we express our warmest thanks to the membership of these committees.

REPORT OF THE COMMITTEE ON MEMBERSHIP

At the Toronto meeting last year a Committee on Membership was appointed to act for one year. The committee consisted of the regional representatives with the Secretary-Treasurer acting as chairman. A letter was addressed by the chairman to all regional representatives urging them to contact persons qualified for membership with the object of inducing them to join the society. It is probable that at least three of the members who joined the society subsequent to this appeal did so as a result of the work of the committee.

T. JOHNSON.

REPORT OF THE WAR EMERGENCY COMMITTEE

During the past year no new undertakings have been launched by the War Emergency Committee and consequently no regional meetings were called. Certain material submitted by the War Committee of the American Phytopathological Society was forwarded to all regional representatives at various times during the past year. Among these may be mentioned the Report of the U.S. War Committee to the Council of the American Phytopathological Society and the notes of the War Committee Conference of last December. The representatives were also kept in touch with developments consequent on the submission to the Deputy Minister of Agriculture and the Director of Science Service of the Society's Memorandum in which the society represented to these authorities the urgent need of developing an adequate extension service in Canada. This memorandum was followed by a resolution passed at the Toronto meeting expressing appreciation of the favorable reception of this memorandum and asserting the belief that in view of the difficulties of implementing such a scheme under existing circumstances, such extension service as may be carried out by the Dominion Plant Pathological Laboratories with their existing staffs should receive official recognition and be expanded as much as is feasible.

In subsequent correspondence from the Director of Science Service to the Secretary-Treasurer, reference was made by the Director to several pronouncements on policy which, in his belief, showed clearly that extension work had already been given official recognition. He stated that extension work carried out from science service laboratories should be co-ordinated with the provincial extension service wherever one exists, and expressed the hope that after the end of the war it might be possible to appoint suitable men to act as liaison officers between science service laboratories and the provincial extension services.

T. JOHNSON.

REPORT OF THE SECRETARY-TREASURER

Mr. President:

I beg to submit herewith the report of the Secretary-Treasurer for the year ending May 31, 1945.

This is the twelfth annual meeting of the Canadian Phytopathological Society. The last annual meeting was held at Hart House, University of Toronto, Toronto, Ont., June 26 to 28, 1944. It consisted of a business session followed by sessions devoted to symposia on the following subjects: Extension Work in Plant Pathology; Bacterial Ring Rot of Potatoes; Virus Diseases of Tree Fruits; and Seed-Borne Diseases. The meeting was concluded by a brief business session. The society was fortunate in securing the attendance of Dr. R. J. Haskell, of Washington, D.C., who outlined extension methods in the United States to the symposium dealing with extension work. A pleasant and instructive feature of the meeting was an address, on the evening of June 26, by Professor H. S. Jackson, on life cycles and phylogeny in the higher fungi, with special reference to the rusts.

Among several visitors present at the meeting was Mr. W. A. McCubbin of the Division of Foreign Plant Quarantines, Bureau of Entomology and Plant Quarantines, U. S. Department of Agriculture, who called the attention of the meeting to an outbreak on Long Island, New York, of the golden nematode (*Heterodera rostochiensis*) on potatoes. A resolution was accordingly passed urging that a search be made for this nematode in the principal potato growing areas of Canada. This resolution was submitted to the Deputy Minister of Agriculture and the Director of Science Service. The latter subsequently assured the Secretary-Treasurer that the resolution was at once referred to the Dominion Entomologist.

ELECTION OF OFFICERS

Nomination ballots were sent out on March 10 to be returned on or before April 9. A total of forty ballots were returned, resulting in the nomination of L. W. Koch, D. J. MacLeod, and P. M. Simmonds for President; A. W. Henry, T. Johnson, and J. C. Perrault for Vice-President; M. W. Cormack, R. E. Fitzpatrick, and J. W. Groves for Councillor; and W. A. F. Hagborg, R. C. Russell, and R. S. Willison for Secretary-Treasurer.

Electoral ballots were sent out about the middle of April to be returned on or before May 5. Fifty-one ballots were returned, resulting in the election of L. W. Koch as President, T. Johnson as Vice-President, R. E. Fitzpatrick as Councillor, and R. C. Russell as Secretary-Treasurer. A. M. Brown, W. J. Cherewick, and W. L. Gordon acted as scrutineers.

MEMBERSHIP

At the end of May, 1944, the paid-up membership was seventy-one. Of these, one has since been elected to honorary membership. The remaining seventy members all paid their fees for the year 1944-45. During this year five former members were re-instated and nine new members were admitted to the society. The membership on May 31, 1945, therefore, stood at eighty-four, an increase of thirteen over the preceding year.

FINANCES

As shown by the attached financial statement, the revenue for the year 1944-45 was $100.74. Expenditure was $142.15 of which the chief item was the printing of Proceedings No. 12 ($98.55). The net balance at the end of the year was $62.51 to which, however, should be added the $500.00 Victory Bond purchased with funds of the society in 1942.

Respectfully submitted,

T. JOHNSON, *Secretary-Treasurer.*

FINANCIAL STATEMENT

1944-1945

Revenue:

Balance Forward			$103.92
Fees:			
1944-45	$78.18		
1945-46	5.18		
		$ 83.36	
Sale of Proceedings		1.00	
Bank Interest		.48	
Premium on U.S. Currency		.90	
Interest on Bond		15.00	
		$100.74	$204.66

Expenditure:

Printing of Proceedings No. 12	$ 98.55
1944 Meeting (Incidental Expenses)	10.00
Stamps	18.00
Stenographic Services (1943-44)	15.00
Bank Exchange	.60
	$142.15
Balance (in bank and cash on hand) May 31, 1945	$ 62.51

Additional Asset:

Dominion of Canada 3% Victory Bond, due 1954	$500.00

Audited and found correct,

(*Signed*) F. J. GREANEY,
W. L. GORDON.

June 21, 1945.

THE CANADIAN PHYTOPATHOLOGICAL SOCIETY
CONSTITUTION

ARTICLE I

This society shall be known as The Canadian Phytopathological Society.

ARTICLE II

Membership

Section 1.—All persons interested in the science or practice of plant pathology shall be eligible for membership.

Section 2.—There shall be five kinds of members:

(a) Regular members.

(b) Life members: any member who may desire to compound for his annual subscriptions by the payment of the life member's fee.

(c) Student members: any junior, senior or post-graduate student at a university or agricultural college of recognized standing.

*(d) Honorary members: any person, whether or not a member of the society, who has rendered eminent service, or has done honor in any way to the society, or to the profession, shall be eligible for election as an honorary member.

(e) Charter members: all members joining the society prior to March 1, 1930, shall be duly enrolled as charter members.

ARTICLE III

Membership Fees

Section 1.—Each member shall pay such fees as the society shall determine.

*Section 2.—The name of any member whose fees are unpaid at the end of the fiscal year shall be removed from the list of members. At any subsequent time, on payment of the fees due, such a member may be reinstated by the Secretary-Treasurer without the formalities required for a new member.

ARTICLE IV

Election of Members

*Section 1.—Regular and student members may be elected only at a regular meeting of the Society. Applications for membership must be endorsed by at least two members of the Society, and must be approved by the Council.

Section 2.—Honorary members shall be recommended by the Council, and be elected by unanimous consent of the members present at any regular meeting of the Society.

ARTICLE V

Officers

Section 1.—The officers of the Society shall consist of one President, one Vice-President, one Secretary-Treasurer, and two Councillors (one of whom shall be the retiring President). The President, Vice-President and Councillors shall serve for one year, and the Secretary-Treasurer for two years. The Council shall have power to fill any vacancies occurring in the interim between elections. The Council shall consist of the President, Vice-President, Secretary-Treasurer, the retiring President, and one additional Councillor to be elected by the Society.

*Section 2.—The Council shall each year appoint as many Regional Representatives as may be authorized by motion passed at a business session of the Annual Meeting. It shall be the duty of such Representatives to act as liaison officers between the Council and the Society members in their various districts and to arrange such regional meetings as may from time to time be desirable.

*ARTICLE VI

Election of Officers

(a) The nomination of officers shall be performed by a Nominating Committee.

(b) The Nominating Committee shall consist of the two immediate past presidents of the Society (retiring President as Chairman) and three additional members elected at the first business session of an annual meeting. The Nominating Committee shall submit a slate of officers to the Secretary ninety days prior to the first Annual Meeting following their appointment. Not more than three nominees shall be proposed by the Committee for any one office.

*Amendments.

(c) Not less than sixty days prior to an Annual Meeting the Secretary shall send to all members notifications of the nominations made by the Nominating Committee.

(d) Additional nominations for any office may be made from the Society at large but notice of such nominations shall reach the Secretary at least thirty days prior to the Annual Meeting and be signed by not less than five members.

(e) Whenever a vote is necessary for the election of officers, the ballot shall be prepared by the Secretary and, for each office, shall contain the names of the nominees of the Nominating Committee and any additional nominations made for that office according to the regulations set forth under section (d) of this article.

(f) One ballot shall be mailed to each member privileged to vote (g), who shall indicate his preference for the candidates for each office by marking a first, second, and third choice in each case. The ballot shall be returned enclosed in an outer identification envelope. The ballots shall be counted by a committee of three scrutineers consisting of the Secretary as Chairman and two additional persons appointed by him. The Chairman shall withhold his vote until the ballots have been counted, but shall cast the deciding vote in case of a tie. The "first choice" votes for each office shall be counted first and, if one of the candidates shall have obtained a greater number of such votes than the combined totals of the other candidates, that candidate shall be declared elected. In the event of no candidate for a given office thus receiving a majority vote on the first count, the "second choice" votes on the ballots of the candidate receiving the fewest number of "first choice" votes shall be added to the first choice votes of the remaining candidates. In case the ballot contained more than three nominations, this process shall be repeated, if necessary, until one candidate has received a majority of the votes.

(g) A member privileged to vote is any regular, student, life, or charter member.

(h) In the event of an Annual Meeting not being held, the officers shall hold office for a second year. If, for a second year, no Annual Meeting is held, the Nominating Committee shall nominate a slate of officers for the ensuing year.

*ARTICLE VII

Meetings

Section 1.—Unless the Council deems it inexpedient so to do, an Annual Meeting shall be held at such time and place as it may select. Additional meetings may be arranged by the Council at its discretion.

Section 2.—Regional meetings may be called by the Regional Representatives. A copy of the minutes of such meetings, or a condensation of the same, shall be forwarded to the Secretary-Treasurer, to be dealt with at his discretion.

ARTICLE VIII

Quorum of Council

Three shall constitute a quorum of the Council for the transaction of business.

ARTICLE IX

Committees

Committees, whether special or standing, may be appointed by the Council at any time between Annual Meetings, or at an Annual Meeting.

*ARTICLE X

Council Meetings

The Council shall meet, if possible, at least once each year, but may, however, be called together by the President if he deems it necessary.

ARTICLE XI

The Society may become affiliated with any other society providing such affiliation is authorized by majority vote of all members in good standing.

*ARTICLE XII

Publication of Proceedings

There shall be published each year the Proceedings of The Canadian Phytopathological Society, unless at the discretion of the Council it is deemed inexpedient.

*Amendments.

*ARTICLE XIII

The books of the Society shall be audited each year by two auditors appointed by the President at the first business session of the Annual Meeting.

*ARTICLE XIV

Section 1.—This Constitution may be amended providing each amendment is approved by three-quarters of the members voting thereon and providing that at least 50 per cent. of all the members have returned ballots. Such vote shall be taken by mail ballot, following a notice of motion and discussion at an Annual Meeting. Copies of such notices of motion must be mailed by the Secretary to each member at least two weeks previous to the date of the Annual Meeting.

Section 2.—All amendments to this Constitution shall be published in the Proceedings of the Society.

*Amendments.

Note.—The amended draft of the Constitution, given above, was approved by more than seventy-five per cent. of the members of the Society, in a ballot conducted in November, 1945.

ABSTRACTS (OR SUMMARIES) OF PAPERS PRESENTED AT THE TWELFTH ANNUAL MEETING OF THE CANADIAN PHYTOPATHOLOGICAL SOCIETY

SEED TREATMENT AND DATE OF PLANTING TESTS ON PEAS AT SASKATOON

R. J. LEDINGHAM, Dominion Laboratory of Plant Pathology, Saskatoon, Sask.

In recent years the acreage of peas in parts of Saskatchewan has increased substantially and the need has arisen for more information on cultural and disease control methods. Experiments on dates of planting have indicated that while garden peas are best planted as early as possible while the soil is cool, a better stand of field peas may be expected if the planting is delayed until the soil is warmer. The use of a suitable seed treatment is to be recommended, both as a factor in increasing the emergence and in controlling seed-borne diseases.

EFFECT OF STORAGE ON TREATED SEED

H. W. MEAD, Dominion Laboratory of Plant Pathology, Saskatoon, Sask.

Seed of wheat, barley, oats and flax, untreated and treated with Ceresan, was stored in an open bin, in a sack, and in a tight can for thirteen months. This material was kept in a seed barn at the University. Germination tests at regular intervals showed that there was very little change in normal germination of wheat, oats, and barley over that period and the method of storage made little difference. Treatment of the seed improved germination very slightly, though it also caused some injury in closed storage after several months. With ordinary storage, no damage was done by Ceresan. The viability of untreated flax seed remained high in the bin and sack, but it deteriorated in closed storage. Germination of treated flax was always higher than that of untreated flax, although some injury occurred in closed storage.

THE LONGEVITY OF THREE BACTERIAL PATHOGENS OF CEREALS UNDER CERTAIN STORAGE CONDITIONS

W. A. F. HAGBORG, Dominion Laboratory of Plant Pathology, Winnipeg, Man.

To replace time-consuming methods, a simple but effective procedure has been developed for the preservation of cultures of bacterial pathogens of the type that normally live over winter in a dry state. The method is as follows: Susceptible host seedlings are inoculated under greenhouse conditions. After maturation of the lesions, portions of the leaves are placed in glassine envelopes and held for at least twenty-four hours at about the optimum temperature for the growth of the organism in culture. They are then placed in closed glass dishes and held in an electric refrigerator at approximately 11°C. Reisolation is by means of dilution plates of beef peptone agar following surface sterilization. Because of the danger of attenuation, the method is best suited to storage periods not exceeding one year.

The method described above has been used in over 800 trials with the three bacterial pathogens of cereals common in Western Canada. These organisms were found capable of surviving for several years. About 30 per cent. of the *X. translucens* cultures and a few cultures of *Ps. coronafaciens* were still viable after over eight years in storage, but practically all cultures of *Ps. atrofaciens* were non-viable after seven years in storage. Reisolations made at intervals during the storage period showed that the rate of loss of viability per lesion was approximately equal for the three organisms.

A NEW APPROACH TO THE SMUT PROBLEM

R. C. RUSSELL, Dominion Laboratory of Plant Pathology, Saskatoon, Sask.

A new approach to the smut problem is developing in the Prairie Provinces. Instead of recommending the treatment of all cereal seed for the control of certain smuts, it is considered

advisable to treat the samples known to be badly smutted and to test all other seed suspected of carrying these smuts, and to apply treatment only when it is needed. The general adoption of this method would result in a considerable saving to the farmers of the West.

During the past few years, the examination of large numbers of seed samples by the Associated Laboratory Services showed that approximately 85% of the wheat, 40% of the oats, and 30% of the barley, from Saskatchewan, did not require treatment for the control of smut.

Field experiments conducted for four successive years with tested samples indicate that seed which bears a "trace minus," or less, of infection does not produce appreciable amounts of smut in the resultant crop. Experiments are under way to determine the proper limits of tolerance, in this respect, more exactly.

DETECTING THE LOOSE SMUT FUNGUS IN EMBRYOS OF BARLEY AND WHEAT

P. M. SIMMONDS, Dominion Laboratory of Plant Pathology, Saskatoon, Sask.

Examinations of cereal seed samples to determine surface-borne smuts have been successfully conducted for many years. The internally-borne smuts, the true loose smuts of barley and wheat, however, have been difficult to determine in a routine way. The results reported in this paper give some promise towards a solution of the problem of a routine examination for detecting true loose smut. Two methods were reported. In the first, the embryos are removed in mass by chemical treatment then cleared in oil so that the fungus may be seen within the tissues. In the second method, the embryos are removed, embedded in wax, and sectioned in mass. Then, by staining, the fungus is demonstrated and percentage counts made.

If methods of this type stand up in actual practice, then it is a comparatively simple matter to develop a complete program of seed examination to determine the occurrence of the smut diseases.

TESTING WHEAT SEEDLINGS FOR RESISTANCE TO HELMINTHOSPORIUM SATIVUM

P. M. SIMMONDS and B. J. SALLANS,
Dominion Laboratory of Plant Pathology, Saskatoon, Sask.

The fungus, *Helminthosporium sativum*, is probably the principal causal organism in the common rootrot of wheat. It has always been a difficult and time-consuming procedure to test new varieties and lines for resistance to root diseases. The tests reported here have to do with the development of a rapid test for wheat seedlings. The tests were made in test-tubes or Petri dishes and could be completed in seven days. The seeds were inoculated with a conidial suspension from seven-day-old potato dextrose agar slants. So far as the trials have gone, they show that Marquis, Thatcher, Red Bobs, and Apex, have some resistance to this fungus, whereas Mindum, Regent, Reward, Pelissier, and Renown are susceptible. In general, the results agree quite well with field experiments.

The methods are considered particularly useful in selecting parental material and in testing new lines.

A RAPID METHOD FOR DETERMINING THE RESISTANCE OF WHEAT VARIETIES TO ROOT-ROTTING FUNGI

W. C. BROADFOOT and L. E. TYNER,
Dominion Laboratory of Plant Pathology, Edmonton, Alta.

The resistance of various varieties of wheat to root-rotting fungi can be determined by growing seedlings for five or six days in test tubes containing an extract of the fungus. Rate of root growth indicated the resistance of each variety. Results obtained by this quick method were comparable to those obtained under field conditions. This method appears to have promising possibilities in connection with breeding varieties resistant to the root rots.

THE INFLUENCE OF VARIOUS CROP ROTATIONS ON ROOT ROTS OF CEREALS AND ON THE SOIL MICROFLORA

L. E. TYNER, Dominion Laboratory of Plant Pathology, Edmonton, Alta.

The influence of various crop rotations on root rot of cereals and the effect of these crops on the growth of bacteria and fungi in the soil were discussed. Wheat, oats, barley, and beans, were grown in rootrot soil, and the numbers of bacteria and fungi on their roots were determined. The fungi numbered as high as 100,000,000 per ounce of wheat roots with the adhering soil, whereas 15,000,000 per ounce was the maximum found on the roots of the other plant species. In the case of bacteria, the highest count recorded was on barley roots, at 12,000,000,000 per ounce. Both fungi and bacteria found on or near the roots were from 10 to 100 times as numerous as in the soil itself.

THE EFFECT OF RUST ON THE YIELD AND QUALITY OF CERTAIN VARIETIES OF WHEAT, OATS, BARLEY, AND FLAX

B. PETURSON and M. NEWTON,

Dominion Laboratory of Plant Pathology, Winnipeg, Man.

A study was carried out at Winnipeg during the period 1938 to 1944 to determine the effect of several rusts; namely, leaf rust of wheat (*Puccinia triticina* Erikss.), leaf rust of barley (*Puccinia anomala* Rostr.), stem rust of barley (*Puccinia graminis* Pers.), crown rust of oats (*Puccinia coronata* Corda), and rust of flax (*Melampsora lini* (Pers.) Lev.), on the yield and quality of field crop varieties commonly grown in Western Canada. The experiments were conducted under field conditions. Comparisons were made between crops produced in rust-free and rusted rod-row plots of each variety tested. In each test one-half of the plots of each variety were kept free of rust by dusting them with sulphur during the growing season, and the remaining plots were artificially inoculated with rust. The quality determinations on the flax and barley varieties were made at the Grain Research Laboratory, Board of Grain Commissioners for Canada, Winnipeg, Manitoba, and the milling and baking tests and wheat protein determinations were carried out in the Milling and Baking Laboratory of the Cereal Division, Experimental Farms Service, Ottawa.

Heavy infection of leaf rust very materially reduced the yield, bushel weight, and grade of the varieties Thatcher, Apex, Renown, and Regent. Apart from a slight reduction in per cent flour yield, and a small increase in the yellow pigment of the seed, leaf rust had no adverse effect on the milling and baking quality of the grain. In fact, the flour milled from the rusted samples was superior in baking strength to that milled from the non-rusted samples. Under field conditions, the rust had a variable effect on the per cent protein of the grain. In one year it increased the per cent protein of the seed, but, in three other years it decreased the per cent protein.

The barley varieties O.A.C. 21, Mensury, Chevron, Peatland, Regal, and Plush were, with the exception of Mensury, significantly reduced in yield, bushel weight, and kernel weight by a severe infection of leaf rust of barley. This rust adversely affected the value of all the varieties for malting purposes by reducing the percentage heavy-grade kernels. The nitrogen content and the wort nitrogen content were reduced by rust, but extract and diastatic powers were not greatly affected. Grades were also adversely affected by rust.

Stem rust had much the same effect on susceptible varieties of barley as had leaf rust. However, the reductions in yield, quality, and grade, caused by this rust, were more pronounced than those caused by leaf rust.

Moderately heavy infections of crown rust adversely affected the yield, bushel weight, and grade of Richland and Vanguard oats. The reductions caused were statistically significant.

Two susceptible flax varieties, Bison and Redwing, were materially reduced in yield by flax rust. The rust infection, however, which was only moderately heavy, caused no reduction in grade, and had no significant effect on the protein and oil content of the seed. With but few exceptions the iodine value of the oil from the rusted samples was slightly greater than that of the oil from the non-rusted samples. The differences in iodine value were, however, not statistically significant.

COMMON ROOTROT IN RELATION TO WHEAT YIELDS IN SASKATCHEWAN

B. J. SALLANS, Dominion Laboratory of Plant Pathology, Saskatoon, Sask.

A statistical study has been made of common rootrot as it affects wheat crops. The proportion of plants affected by the fungi causing the disease varies rather widely from year to year, the disease tending to be most severe in dry, hot seasons and least severe in cool, moist seasons.

Yields of wheat were estimated on the basis of various beneficial factors such as rainfall during June and July, rainfall of the preceding summer and fall, and such injurious factors as high temperatures, insect damage, and common rootrot. It was shown that such prediction equations were improved by including a term for common rootrot. This fact indicates that common rootrot does appreciable damage to wheat in Saskatchewan, and therefore is quite worthy of continued investigation.

FACTORS CONCERNED IN ESTIMATING LOSSES FROM BROWNING ROOT ROT OF WHEAT IN SASKATCHEWAN

T. C. VANTERPOOL, the University of Saskatchewan, Saskatoon, Sask.

Because of various aspects of this disease, it is extremely difficult to arrive at an exact estimate of annual losses incurred in the whole province.

In computing the loss the following factors were considered: (1) average reduction in yield between diseased and normal areas in the field is 35 per cent (actual field data); (2) percentage number of infested summerfallow wheat fields in each Crop District (largely estimated); (3) average percentage of diseased areas in infested fields (largely estimated); and, (4) wheat production on summerfallow in each Crop District (largely estimated)—Provincial statistics give only the total wheat production including that from stubble.

The average yearly estimate of losses arrived at was a few thousand bushels under 2,000,000. This estimate is conservative and should not be considered alone, but in conjunction with the

following facts: (1) that only wheat on summerfallow is considered, though other cereals on summerfallow may suffer similarly; (2) that indirect losses from rust and frost may be considerable in years when rust or frost or both coincide with a browning epidemic; (3) that reduction in tillers renders the plants more liable to loss from weeds; (4) that a reduction in grade usually occurs; (5) that the increased use of phosphate fertilizers in some districts might mislead the pathologist on survey into thinking that the particular district is naturally free from browning in that particular year; the use also, of slightly more resistant varieties, such as Thatcher and Apex, tends to have the same effect; (6) that losses partly due to browning root rot are attributed to drought in some years; (7) that the root rot does not kill the plants outright; and, (8) that there is a relatively short time (2 to 3 weeks) in which browning root rot can be easily detected while on survey.

With these facts in mind it will be realized that the indirect losses from browning may be considerable—actually often surpassing any estimated direct loss.

The 2,000,000 bushel average annual loss should serve only as a base number for the other indirect losses. However, in years when browning is widespread through all crop districts in Saskatchewan except the southwest (3, 4 and the south part of 7), the direct loss may be as much as five times that amount.

SOME OBSERVATIONS ON FLAX DISEASES AS REVEALED BY FIELD SURVEYS

T. C. VANTERPOOL, the University of Saskatchewan, Saskatoon, Sask.

For some years June and pre-harvest surveys on flax diseases have been made in central Saskatchewan. The June surveys have shown that in most seasons seedling blight (*Rhizoctonia solani*) causes appreciable reductions in flax stands. Cotyledonary lesioning (*Polyspora lini*) is frequently severe in some fields, but the subsequent amount of stem-break or browning developing in such fields is closely dependent on rainfall. Heat canker, and blighting caused by wind-blown sand, are occasionally encountered. Frequently there is a considerable increase in the percentage of various diseases on both crop and seed when flax follows flax, as compared with flax on fallow grown from the same seed. Because old stubble is a serious source of inocula, stubble fields should be ploughed before the new crop is up. It is found that fields to the south (windward) of stubble fields receive considerably less inoculum than fields to the north (leeward). A physiological die-back in which the top two-thirds of the plant turns brown prematurely has attracted attention recently and in some areas may be quite general. Rust and wilt are kept within reasonable bounds by growing resistant varieties. Traces of wilt if not observed in the earlier part of the growing season are very difficult to detect later. A *Selenophoma* not previously reported on flax has been found attacking the upper parts of the plant late in the season. The following pathogens have frequently been isolated from seed, but have not been detected in commercial fields; namely, *Phoma exigua, Helminthosporium sativum, Botrytis cinerea, Alternaria linicola* and bacterial species. Anthracnose, pasmo and mildew have not been found in commercial fields. Cases have been observed, especially in the north, where a delay in harvesting after the seed was ripe, has resulted in an increase in the percentage of seed-borne fungi. Flax intended for seed purposes should be sown early so as to increase its chances of maturing before the late-season diseases reach their peak and, in any case, harvested as soon as it is ripe.

AN APPARENTLY UNDESCRIBED SEPTORIA ON CEREALS IN CANADA

T. JOHNSON, Dominion Laboratory of Plant Pathology, Winnipeg, Man.

A *Septoria* with pycnospores larger than those of *S. nodorum* Berk. and conforming closely to those of *S. Avenae* Frank (*Leptosphaeria avenaria* Web.) has been found to occur on wheat and more rarely on barley in Canada. Unlike *S. nodorum* it does not cause glume blotch, the pycnidia being largely confined to the leaves and occurring very rarely on the heads. It proved a weaker parasite than *S. nodorum* on wheat seedlings and was unable to attack seedlings of barley and oats. Barley and certain wheat varieties, though practically immune in the seedling stage, are attacked in the mature-plant stage, particularly when the leaves begin to fade. The perfect stage, referable to *Leptosphaeria* and very similar to *L. avenaria* Web., has been found several times on wheat plants and once on oats and has occurred in cultures derived from pycnospores collected on wheat and barley. Owing to morphological similarity to *L. avenaria* Web. the organism is provisionally regarded as a parasitic form of that species.

CROWN ROT OF ALFALFA

M. W. CORMACK, Dominion Laboratory of Plant Pathology, Edmonton, Alta.

Crown rot of alfalfa, caused by a low-temperature basidiomycete, occurs in the alfalfa growing areas of Alberta and has been found in Saskatchewan, Manitoba, and British Columbia. It develops in the late winter or early spring about the same time as winter killing is recognized, and may cause very severe damage in certain seasons. Crown rot was partly responsible for the extensive killing of alfalfa in the White Fox district in 1942. The Edmonton laboratory is cooperating with the Dominion Forage Crops Laboratory at Saskatoon to develop resistant strains of alfalfa. Grimm and other commonly grown varieties are, unfortunately, very susceptible. Turf grasses, timothy, alsike, iris and other ornamentals are also attacked. Some grasses and legumes suffer much less damage than others when planted in land where alfalfa is killed out by crown rot. Such land should be planted to an annual crop for about two years before re-planting alfalfa. Crested wheat and brome grass appear to be highly resistant and can also be safely grown

immediately after diseased alfalfa is ploughed down. Experiments in progress on the effect of snow cover, moisture, chemical treatments, and fertilizers on the disease were described.

OCCURRENCE OF PLANT PATHOGENIC STRAINS OF BACILLUS POLYMYXA IN ALBERTA SOILS

A. W. JACKSON and A. W. HENRY, the University of Alberta, Edmonton, Alta.

Bacillus polymyxa, a bacterium best known for its ability to ferment starch directly to form products such as 2-3 butylene glycol and ethyl alcohol, the former useful as an antifreeze and in the manufacture of artificial rubber, is also capable of causing disease in vegetables.

Plant pathogenic strains of this spore-forming bacterium were found to occur widely in Alberta soils. All isolates obtained from the soil together with several from other sources proved capable of rotting potato tubers when introduced through wounds under conditions of abundant moisture and high temperature.

In these studies pure cultures of *Bacillus polymyxa* rotted potato slices at temperatures from 20°C to 43°C and whole tubers at temperatures from 30°C to 43°C but caused no damage below the minimum temperatures mentioned. The effect of temperatures above 43°C was not determined.

Potato tubers and other vegetables which are formed in the soil no doubt frequently come in contact with *Bacillus polymyxa*, but are not rotted by it except when temperature and other factors are favorable. In general, soil temperatures in the field in Alberta are not conducive to the decay of potatoes by this organism but those near the soil surface may on occasion reach favorable levels. The fact that *B. polymyxa* can be isolated quite frequently from rotted stored potatoes indicates that it is of some importance as a cause of decay in harvested potatoes. If, however, recommended storage temperatures are maintained in the storage quarters no damage from this organism should occur.

INTERNAL DISCOLORATION OF POTATOES

G. B. SANFORD, Dominion Laboratory of Plant Pathology, Edmonton, Alta.

Different factors causing phloem necrosis (net necrosis) of potato tubers in Western Canada were discussed. Of these, the virus causing the leaf-roll disease, which virus is transferred from diseased to healthy plants in the field by several species of plant lice, is the most common cause of tuber phloem necrosis. Therefore, the rate of spread of the leaf-roll disease under field conditions from healthy plants depends largely on the abundance of plant lice—and these are usually plentiful during July and August.

Another agent capable of stimulating the development of tuber phloem necrosis is the tomato psyllid feeding on potato vines during midsummer. There are also other agents, so the problem is to discover them as well as the means for their control.

DEMONSTRATION GARDENS
ANOTHER WAY OF SPREADING PHYTOPATHOLOGICAL INFORMATION

J. E. MACHACEK, Dominion Laboratory of Plant Pathology, Winnipeg, Man.

During the war, many urban dwellers became interested in Victory gardens, and indications are that for some time to come there will be more gardening in urban centers than prior to the war. Virtually no phytopathological services have been available to urban gardeners. As the urban population in Canada exceeds that in rural areas, it seems unfair that city gardeners should be without organized agricultural services.

To provide a partial remedy for this situation, the Dominion Laboratory of Plant Pathology at Winnipeg approached the mayor and council of the City of Winnipeg, asking this body to make available for purposes of demonstration gardens certain unoccupied lots within the city. The Laboratory stipulated that a lease for at least a five-year period be given and that the lots be situated on streets with considerable pedestrian traffic. After being given an outline of the objects of the Demonstration Gardens —to show various garden diseases and practical ways of controlling them—the council unanimously approved the idea and granted a five-year lease on two suitable tracts of land, with an understanding that land at other sites would be granted if they were considered necessary by the Laboratory.

Demonstration Garden No. 1 was in full operation in 1945, while Garden No. 2 was in partial operation. In Garden No. 1 were planted potatoes (to show differences between certified and diseased seed stocks and effect of spraying), 10 varieties each of beans and peas (sown treated and untreated), 2 varieties of carrots (part of each row dusted to control the vector of yellows), 1 variety each of cabbage, cauliflower, and broccoli (part of each row dusted to control cabbage worm), 12 varieties of tomatoes (to show varietal resistance to various diseases, particularly bacterial speck and Septoria leaf spot), and 10 varieties of sweet corn (to show varietal resistance to smut). In each case, the crop and variety name, together with the object of the planting, was on a suitable stake, and the garden itself was marked by a painted sign bearing the legend: "Canada—Department of Agriculture—Demonstration Garden."

Each garden was open to the public for unrestricted inspection, and on one evening a week a member of the Dominion Laboratory of Plant Pathology at Winnipeg was in attendance to answer questions. In addition, the Winnipeg Victory Garden Committee plans to hold one or two field days at the garden, and to have speakers address the visiting public on suitable horticultural topics.